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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/05/2001

Chris Kyriakakis

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3084

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01/14/2005

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EXAMINER

PALADINI, ALBERT WILLIAM

ART UNIT

PAPER NUMBER

2125

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/970,705

Applicant(s)

KYRIAKAKIS, CHRIS

Examiner

Albert W Paladini

Art Unit

2125

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: Pare 2 references Haneda et al, but o information is provided about this references in an IDS.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The summary of the invention on page 3 explains the objective as creating a combined model of the Head Related Transfer Functions for all directions, and the detailed description on pages 5-10 are directed to supporting this objective. The specification does not describe and support the "localization of sound" as recited in claim 1.

The relationship of the variables to obtain the HRTF is contained on pages 6 through 9. However, none of the variables contained in the relationships are defined.

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Although an invention may reference another source, the invention must be self-contained so as to be understood. Thus, the variables must be clearly defined.

Appropriate correction and clarification is required.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

Claim 1

The claim does not recite a series of sequential, logical steps, which result in the objective of the "localization of sound." It is written in a single paragraph, and suggests taking some measurements and creating some sort of a filter. The objective of localizing the sound implies that the sound is contained within a volume of space. The claim does not recite, where within this volume, measurements are taken. It is assumed that the state space model characterizes sound at various positions in the initial space volume. The claim does not explain how synthesizing a filter results in achieving the objective of localizing the sound. The nature of the filter is not explained. It may range from one of many electrical circuit filters to state variable Kalman filters.

Appropriate correction and clarification is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Haneda (5187592).

This rejection was made by considering the limitations which were understood in the context of the claimed objective.

Haneda discloses an acoustic transfer function simulator and method, which localizes sound using head related transfer functions and filters. He states from column 7, line 57 to column 8, line 65 "A second example of the conventional acoustic transfer function simulator, to which the present invention pertains, is a sound image localization simulator. The sound image localization simulator is a device which enables a listener to localize a sound image at a given position while the listener is listening through headphones. The principle of such a sound image localization simulator will be described with reference to FIG. 5. In FIG. 5, when the signal $X(z)$ is applied to a loudspeaker 34, an acoustic signal therefrom reaches right and left ears of a listener 35 while being subjected to acoustic transmission characteristics $H_{\text{sub.R}}(z, \theta)$ and $H_{\text{sub.L}}(z, \theta)$ between the loudspeaker 34 and the listener's ears. In other words, the listener 35 listens to a signal $H_{\text{sub.R}}(z, \theta)X(z)$ by the right ear and a signal $H_{\text{sub.L}}(z, \theta)X(z)$ by the left ear. The acoustic transfer characteristics $H_{\text{sub.R}}(z, \theta)$ and $H_{\text{sub.L}}(z, \theta)$ are commonly referred to as head-related transfer functions (HRTFs), and the difference in hearing between the right and left ears, that is, the difference between $H_{\text{sub.R}}$ and $H_{\text{sub.L}}$ constitutes an important factor for humans to perceive the sound direction.

The sound image localization simulator simulates the acoustic transmission characteristics from the sound source to receivers 36R and 36L inserted in listener's external ears as shown in FIG. 5. Signals received by the receivers 36R and 36L in the listener's external ears are equivalent to sounds the listener listens with the eardrums. The sound image localization simulator can be implemented by inserting the receivers 36R and 36L in the external ears, measuring the head-related transfer functions $H_{\text{sub.R}}(z, \theta)$ and $H_{\text{sub.L}}(z, \theta)$ and reproducing the head-related transfer functions by use of a filter. In FIG. 5 the loudspeaker 34 is disposed in front of the listener 35 at an angle θ to the listener. Applying the signal $X(z)$

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from a head-related transfer function measuring device 37 to the loudspeaker 34, the acoustic signal from the loudspeaker 34 reaches the receivers 36R and 36L while being subjected to the acoustic transmission characteristics $H_{\text{sub.R}}(z, \theta)$ and $H_{\text{sub.L}}(z, \theta)$ between the loudspeaker 34 and the listener's ears as referred to above. The head-related transfer function measuring device 37 measures, for example, impulse responses $h'_{\text{sub.R}}(n, \theta)$ and $h'_{\text{sub.L}}(n, \theta)$ of head-related transfer functions $H'_{\text{sub.R}}(z, \theta)$ and $H'_{\text{sub.L}}(z, \theta)$. In this way, sets of impulse response $h'_{\text{sub.R}}(n, \theta)$ and $h'_{\text{sub.L}}(n, \theta)$ of the head-related transfer functions $H'_{\text{sub.R}}(z, \theta)$ and $H'_{\text{sub.L}}(z, \theta)$ are measured for a required number of different angles θ . The sets of the impulse responses thus measured are each stored in a memory 38 in correspondence with one of the angles θ .

In the case of supplying a listener 35' with the signal $X(z)$ from a sound source assumed to be disposed in the direction of a desired angle θ . in FIG. 5, an angular signal represented by the same character θ . is applied to an input terminal 39 together with the input signal $X(z)$. The angular signal θ . is applied as an address to the memory 38, from which is read out the set of impulse response $h'_{\text{sub.R}}(n, \theta)$ and $h'_{\text{sub.L}}(n, \theta)$ corresponding to the angle θ .. The impulse responses thus read out are set as filter coefficients in filters 40R and 40L, to which the signal $X(z)$ is applied. Consequently, the listener 35' listens to a signal $Y'_{\text{sub.R}}(z, \theta) = H'_{\text{sub.R}}(z, \theta)X(z)$ by the right ear and a signal $Y'_{\text{sub.L}}(z, \theta) = H'_{\text{sub.L}}(z, \theta)X(z)$ by the left ear through headphones 41R and 41L. If the simulated transfer functions are sufficiently accurate, then it holds that $H'_{\text{sub.R}} \text{ perspectiveto } H_{\text{sub.R}}$ and $H'_{\text{sub.L}} \text{ perspectiveto } H_{\text{sub.L}}$, that is, $Y'_{\text{sub.R}} \text{ perspectiveto } Y_{\text{sub.R}}$ and $Y'_{\text{sub.L}} \text{ perspectiveto } Y_{\text{sub.L}}$. This agrees with the listening condition described above in respect of FIG. 5, and the listener listening through the headphones 41R and 41L localizes the sound source in the direction of the angle θ .. In other words, the simulation circuit 28 made up of the filters 40R and 40L simulates the head-related transfer functions. In the case of reading out of the memory 38 the impulse response $h'_{\text{sub.R}}(n, \theta)$ and $h'_{\text{sub.L}}(n, \theta)$ corresponding to the desired angle θ ., it is also possible to apply the angle θ . from the outside by detecting, for example, the positional relationship between the sound source and the listener 35'."

Relevant Prior Art

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Moller (6118875) discloses a method and apparatus for simulating transmission of sound to the ear canals of a listener utilizing head related transfer functions in binaural synthesis, where a set of general HTF's re defined for particular angles of sound incidence.

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Hooley (6373955) discloses loudspeakers which utilize a three dimensional array of transducers to localize the perceived sound from the loudspeakers.

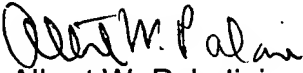
Yasuda (6466913) discloses a method of determining a sound localization filter for approximation of a head related transfer function, and also relates to a sound localization control system incorporating the sound localization filter.

Fujita (6430294) discloses a conventional sound image localization apparatus which includes a data memory which stores a plurality of coefficient sets. Each coefficient set is constructed of a delay coefficient, a filter coefficient, and an amplification coefficient. Each of these coefficient sets corresponds to a direction of a sound source as viewed from an audience, namely a direction (angle) along which a sound image is localized.

9. Any inquiry concerning this communication or earlier communication from the examiner should be direct to Albert W. Paladini whose telephone number is (571) 272-3748. The examiner can normally be reached from 7:30 to 3:30 PM on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Leo P. Picard, can be reached on (571) 272-3749. The official fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

 1-10-05
Albert W. Paladini
Primary Examiner
Art Unit 2125